4. Ports of Entry and Storage Sites

4.1 What process did DOE use to select the ports of entry for spent fuel from foreign research reactors?

Because spent fuel is shipped in large containers, DOE first identified 158 commercial and 8 military ports in the United States that were capable of receiving containerized cargo. DOE then used five criteria to screen these 166 ports:

- Experience handling containerized cargo
- Favorable transit from the port to the ocean
- Appropriate port facilities (adequate water depth at the pier, adequate wharves and quays, at least one crane for removing containers from ships and loading them onto ground transport vehicles)
- Ready access to different modes of ground transportation
- Low human population in the surrounding area (measured at distances of one, five, and ten miles)

After the first round of screening, 17 commercial and 2 military ports remained. DOE used a set of "desirable port attributes" to evaluate these 19 ports. These attributes took into account the following considerations:

- Absence of conflicting activities
- Emergency response capabilities
- Experience handling spent nuclear fuel
- Absence of nearby environmental concerns, such as endangered species
- Absence of environmental concerns associated with severe natural phenomena, such as earthquakes
- Separation of port facilities from urban population centers
- Absence of local restrictions on receipt and handling of spent nuclear fuel
- Availability of secure short-term storage

After the second round of screening, 8 commercial and 2 military ports remained: Charleston Naval Weapons Station, South Carolina; Galveston, Texas; Hampton Roads, Virginia; Jacksonville, Florida; Marine Ocean Terminal at Sunny Point, North Carolina; Concord Naval Weapons Station, California; Portland, Oregon; Savannah, Georgia; Tacoma, Washington; and Wilmington, North Carolina.

4.2 Why did DOE select the Charleston Naval Weapons Station and the Concord Naval Weapons Station as ports of entry for foreign research reactor spent fuel?

Sea shipments of foreign research reactor spent fuel will come to the United States from Europe, Africa, South America, and Asia and will be stored at the Savannah River Site, in South Carolina, and at INEEL, in Idaho. Therefore, DOE decided to select ports of entry on both the East and West Coasts.

All 10 candidates that emerged from the second round of screening were judged acceptable ports of entry. DOE's analysis indicated that the security military ports offered over commercial ports was not required, but comments from the public and government officials expressed a preference for military ports. To increase public confidence, DOE selected the two military ports—Charleston Naval Weapons Station (on the East Coast) and Concord Naval Weapons Station (on the West Coast)—as ports of entry for foreign research reactor spent fuel.

4.3 Before adoption of the new foreign research reactor spent fuel program, had spent nuclear fuel previously entered ports or traveled overland in California?

From 1957 through 1996, more than 170 shipments of spent nuclear fuel originated or ended in California. Many of these shipments passed through the San Francisco Bay area, including 84 shipments of spent nuclear fuel from Navy submarines and surface vessels through Mare Island Naval Shipyard, 3 shipments of spent research reactor fuel from Berkeley to Idaho, and 67 other shipments that either originated or ended in the Bay Area (primarily Oakland and Pleasanton).

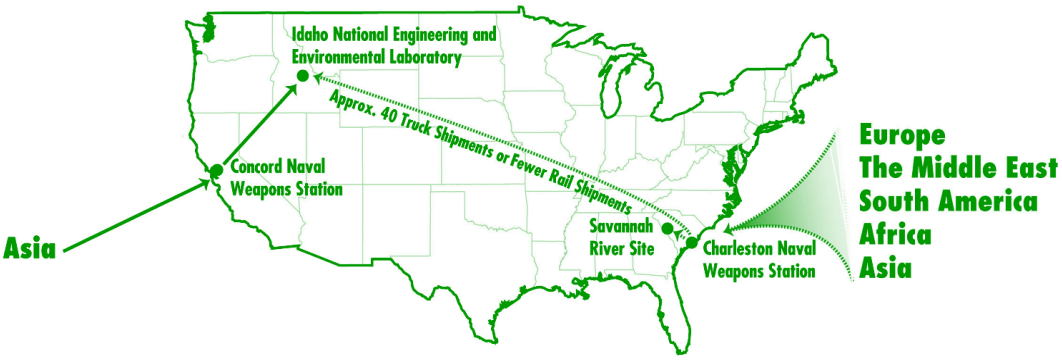
4.4 Before adoption of the new foreign research reactor spent fuel program, had spent nuclear fuel previously entered ports or traveled overland in South Carolina?

More than 580 shipments of spent nuclear fuel either originated or ended in South Carolina from 1957 through 1996. Shipments into or from South Carolina over that period included 72 shipments of spent nuclear fuel from Navy submarines and surface vessels through the Charleston Naval Shipyard; 184 shipments of spent nuclear fuel from South Carolina to other states; and 330 shipments of spent nuclear fuel to South Carolina from other states.

4.5 Why were the Savannah River Site and INEEL selected as storage sites for foreign research reactor spent fuel?

In 1995, DOE decided to adopt a "regionalized" approach to managing spent nuclear fuel. Under this approach, DOE would consolidate different types of spent fuel at three sites. Aluminum-based spent fuel would go to the Savannah River Site; nonaluminum-based spent fuel would go to INEEL; and production reactor spent fuel (from reactors formerly used to produce plutonium) from the Hanford Site, near Richland, Washington, would remain at the Hanford Site.

Before reaching its decision, DOE had considered five sites: the Hanford Site (Washington), INEEL (Idaho), the Nevada Test Site (Nevada), the Oak Ridge Reservation (Tennessee), and the Savannah River Site (South Carolina). DOE selected the Savannah River Site and INEEL because they had the best capability to manage specific types of spent fuel. They were also the only sites with storage capacity to accept foreign research reactor spent fuel in the near term. The Hanford Site, the Nevada Test Site, and the Oak Ridge Reservation would not have had the necessary storage space for approximately 10 years.



4.6 How much foreign research reactor spent fuel will go to the Savannah River Site? How much will go to INEEL?

All sea shipments of aluminum-based spent fuel from foreign research reactors will go to the Savannah River Site. DOE currently estimates that a maximum of 70 sea shipments of aluminum-based spent fuel, of up to 8 casks per shipment, will arrive at the Charleston Naval Weapons Station and be transported to the Savannah River Site. In addition, up to 85 casks of aluminum-based spent fuel from Canada may travel overland to the Savannah River Site. A maximum of 18.2 metric tons of aluminum-based spent fuel from 38 countries could go to the Savannah River Site over the course of the 13-year program.

INEEL is the designated storage site for all Training, Research, Isotope, General Atomic (TRIGA) spent fuel from foreign research reactors. (TRIGA fuel is not aluminum-based and is generally configured in rods.) A total of about one metric ton of TRIGA spent fuel will go to INEEL. Five or fewer shipments of TRIGA spent fuel, estimated to total about 15 casks, from Asia and Pacific Rim countries will enter the United States at the Concord Naval Weapons Station and be transported to INEEL. Another 40 casks (equivalent to 40 truck shipments or a smaller number of rail shipments) of TRIGA spent fuel from research reactors in Europe, Africa, and South America are expected to arrive by ship at the Charleston Naval Weapons Station for transport by truck or train to INEEL.

It is currently uncertain whether Canada, Belgium, the Netherlands, and France will return their aluminum-based research reactor spent fuel to the United States or instead begin managing the spent fuel in anticipation of the end of the U.S. program. If Canada does not participate in the program, no overland shipments (beyond the shipment completed in December 1996) from Canada to the Savannah River Site would occur. If Belgium, the Netherlands, and France do not participate, the total number of sea shipments through the Charleston Naval Weapons Station to the Savannah River Site would drop to about 60. It is also possible that the United Kingdom will manage its own TRIGA spent fuel rather than ship it to the United States.

4.7 When will foreign research reactor spent fuel shipped under the new program arrive in the United States?

Aluminum-Based Spent Fuel

The first shipment of spent fuel from foreign research reactors under the new program arrived at DOE's Savannah River Site on September 22,

1996. That shipment, which contained 280 aluminum-based spent fuel elements, included materials from reactors in Australia, Colombia, Chile, Germany, Sweden, and Switzerland. By the end of May 1998, 4 additional sea shipments had arrived at the Savannah River Site, consisting of spent fuel from research reactors in Germany, Italy, Japan, Spain, Sweden, and Switzerland. The remainder of the approximately 70 sea shipments of aluminum-based spent fuel expected at the Charleston Naval Weapons Station over the 13-year period will arrive at a rate of about 4 to 6 shipments a year, with each shipment containing from six to eight casks.

One truck shipment of aluminum-based spent fuel from Canada was completed in December 1996. Future shipments from Canada have not been scheduled.

TRIGA Spent Fuel

From 1998 through 2009, five or fewer shipments of TRIGA foreign research reactor spent fuel are to arrive at the Concord Naval Weapons Station for transport to INEEL. The first shipment is to occur in mid-1998; the second shipment is expected in late 2002; and the third through fifth shipments are expected from 2003 through 2009.

About 40 casks of TRIGA foreign research reactor spent fuel from Europe, Africa, and South America are expected to arrive at the Charleston Naval Weapons Station over the life of the program. The first cross-country shipment of TRIGA foreign research reactor spent fuel from the Savannah River Site to INEEL is tentatively planned for summer 1999.

4.8 How is foreign research reactor spent fuel transported from the ports of entry and Canada to INEEL and the Savannah River Site?

DOE's environmental impact analysis concluded that foreign research reactor spent fuel could be shipped safely over land by either truck or rail. DOE therefore decided that either mode of transportation is acceptable. Because some members of the public living near the ports of entry strongly preferred the use of rail, however, DOE has sought generally to transport foreign research reactor spent fuel by rail. DOE is considering using trucks in the future to transport foreign research reactor spent fuel from the Charleston Naval Weapons Station to the Savannah River Site.

Trains that carry spent nuclear fuel from foreign research reactors are dedicated trains—that is, they carry no other freight. Shipments from Canada will travel in either dedicated trains or trucks.

A Guide to

Foreign Research Reactor Spent Fuel